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# मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

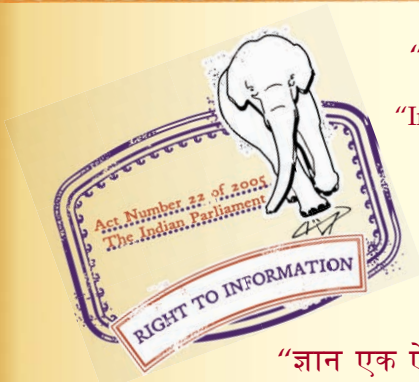
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 10894 (1984): Code of practice for lighting of educational institutions [ETD 24: Illumination Engineering and Luminaries]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*

CODE OF PRACTICE FOR  
LIGHTING OF EDUCATIONAL INSTITUTIONS

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# *Indian Standard*

## CODE OF PRACTICE FOR LIGHTING OF EDUCATIONAL INSTITUTIONS

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# *Indian Standard*

## CODE OF PRACTICE FOR LIGHTING OF EDUCATIONAL INSTITUTIONS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 19 March 1984, after the draft finalized by Illuminating Engineering and Luminaires Sectional Committee had been approved by the Electro-technical Division Council.

**0.2** This Standard has been prepared to deal with the special aspects of lighting for educational institutions and shall be read in conjunction with IS:3646 ( Part 1 )-1966\*, IS:3646 ( Part 2 )-1966\* and IS:3646 ( Part 3 )-1968\*.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS:2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

### 1. SCOPE

**1.1** This standard covers the principles and practices governing good lighting in educational institutions and stresses on the importance of good visual environment for education. It also recommends the level of illumination and quality requirements to be achieved by general principles of lighting.

### 2. TERMINOLOGY

**2.1** For the purpose of this standard the definitions given IS:1885 (Part 16/Sec 1)-1968‡, IS:3646 ( Part 1 )-1966\* and IS:3646 ( Part 2 )-1966\* shall apply.

\*Code of practice for interior illumination:

- Part 1 Principles of good lighting and aspects of design.
- Part 2 Schedule for values of illumination and glare index.
- Part 3 Calculation of coefficients of utilization by the Bz method.

†Rules for rounding off numerical values ( *revised* ).

‡Electrotechnical vocabulary: Part 16 Lighting, Section 1 General aspects.

### 3. LIGHTING CRITERIA FOR VISUAL PERFORMANCE AND COMFORT IN EDUCATIONAL INSTITUTIONS

#### 3.1 General Areas

**3.1.1 General Classroom** — Lighting for classrooms should be evaluated in terms of the effect on students and their performance. Specifically the lighting in classrooms will have a bearing on:

- a) Ability of see visual tasks with speed and accuracy,
- b) Visual comfort, and
- c) Visual pleasantness of a space in which to study and work.

In order to achieve a comfortable balance in the classroom, the recommended maximum luminous ratios between areas of appreciable size from normal view points should be as follows:

- a) 1 to  $1/3$  between task and adjacent surroundings ( such as between a book and the desk top ),
- b) 1 to  $1/3$  between task and more remote darker surfaces ( such as between a book and the floor ), and
- c) 1 to 5 between task and more remote lighter surfaces ( such as between a book and a window ).

**3.1.2 Lecture Rooms** — A comfortable general lighting system which is flexible enough to provide a moderately high level for general use and a subdued level for use during projection or special demonstrations, should be provided for a typical lecture room. Special chalkboard lighting significantly improves visibility and attention powers.

**3.1.3 Corridors** — Corridors in educational institutions not only serve as mere passages/transition areas, but also are used to put up displays, bulletin boards, wall magazines, posters, notices, etc. Special lighting should, therefore, be provided in addition to a good general lighting to enhance the visual vitality of such corridors.

#### 3.2 Specific Areas

**3.2.1 Art Rooms** — As colour is important here, light sources with high colour rendering capability should be used to bring out a more natural appearance of colours over a wide range. Supplementary lighting from directional concentrating sources should be used on displays and models for improved visibility and for modelling purposes.

**3.2.2 Auditoriums** — Auditorium serve as an assembly and lecture hall, study room, theatre, concert hall and for many other activities. Because of these it should be well planned and properly equipped to satisfy the



requirements of all functions. From general lighting to supplementary illumination, care should be taken to provide a good lighting which should blend well with the architecture and at the same time avoid veiling reflections. In particular due consideration should be given to the following aspects:

- a) *Control System* — Dimming facilities should be made available for an auditorium even if it houses a small stage. Wherever dimming facilities are required, the illumination should preferably be designed incorporating GLS light sources. For more complex systems present control consoles are normally used. Selection of dimmers should, however, be decided on budget and simplicity requirements. Dimmers have been constructed using autotransformer ( manual and motor driven ), thyratrons, saturable reactors, magnetic amplifiers and thyristers ( SCRs ), etc.

Care should be taken in designing the switching arrangement which would enable a group or groups of lights to be controlled in specific areas whenever required.

- b) *Specific Areas in an Auditorium*

- (i) *Foyer* — Usually a restful, subdued atmosphere is desirable in the foyer. Illumination from large, low luminance elements such as coves, is one good method. Wall lighting and accents on paintings, posters and plants are important in developing atmosphere. Care must be taken so that light do not spill into the auditorium.
- (ii) *Seating Area* — The seating area should be provided with well diffused comfortable illumination. Luminaires for the basic illumination may include general downlighting units, coves, curtain and mural lights, etc. Supplementary illumination, preferably by a downlighting system should be provided evenly over the seats since the seating area is also used for visual task's and this should be controlled separately. All these lights should be under dimmer control.
- (iii) *Stage Area* — Proper lighting for dramatic presentation extend beyond visibility to the achievement of artistic composition, production of mood effects, and the revelation of forms as three dimensional. These functions of stage lighting result from the manipulation of various qualities, quantities, colours and directions of light and these vary from one performance to the next and even continually throughout a single performance. The layout is affected by the amount and kind of use planned for the theatre.

- (iv) *Emergency Lighting* — Emergency lighting is essential in any auditorium be it small or big. One should ensure that all aisle lights, step lights and lights provided at the rear of the seating area should be connected to the emergency circuit. Besides, exit lights should be provided on every access to guide the audience towards the exist in the event of a power failure.

**3.2.3 Laboratories** — These involve special laboratory tables or benches at which very detailed work is carried out in dissection, inspection of reactions, instrumentation and measurement. Good diffusion with some directional component and appropriate colour quality is required.

Localised general lighting with maximum illumination where the work is being carried out is required on benches or tables.

Provision in form of convenient outlets should be kept for portable lighting equipment required for microscope work and in reading precision instruments and meters.

In Electronics Laboratory care should be taken to provide for suitable filter circuit in fluorescent lamp luminaire form radio frequency suppression.

In laboratories where chemical analysis are done or where presence of corrosive fumes and vapour is expected, it is recommended to use special lighting fittings which are able to withstand the ill effects of the chemical fumes present in the atmosphere.

**3.2.4 Workshops** — Lighting in workshops should not only provide necessary quantity and quality of illumination required for optimal performance of a given task but should also aid to safety of the personnel. For guidance regarding general features and factors influencing good lighting practices for workshops, reference should be made to IS:6665-1972\*.

**3.2.5 Libraries and Reading Room** — In these areas lighting should be of very high quality since printed illustrative matter involves veiling reflections from overhead lighting, special care should be taken to use lighting equipment that will minimise the concentration of the light directly downward which in turn causes reduction of contrast.

Since it is necessary to identify books by number and author on book spines, the visual task in book stacks may be difficult. Perimeter book stacks located around the walls of reading rooms are usually illuminated by the general lighting system of the room, and stacks along the centre of the aisles are illuminated by continuous rows of fluorescent luminaires with specially designed distributions.

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\*Code of practice for industrial lighting.

For book shelves a high level of illumination in the vertical plane is paramount since students have a tendency to leaf over or read a book at the bookshelf. This should be applicable up to the bottom-most shelf and hence the work plane should be taken at floor level for designing a scheme.

Above gives the general guidelines to be followed in designing the lighting for libraries. For further details regarding principles and practices governing good lighting reference should be made to IS : 2672-1966\*.

**3.2.6 *Gymnasiums*** — A Gymnasium is a multi-purpose as well as multi-sport area, serving a variety of needs of the student body and community in general, including such activities as assemblies, concerts and dances. Besides a good general illumination, use of portable or temporary auxiliary equipment should be made wherever creation of mood or atmosphere is the objective.

Wire guards or other means of protection should be provided on the luminaires to prevent breakage, because the luminaires in a gymnasium are vulnerable to flying balls, shuttles, etc, used in aerial sports played inside a gymnasium.

The open portions and windows in luminaires for use in gymnasium can present serious problem, similarly improperly located luminaires and unshielded fenestration could be hazardous.

**3.2.7 *Cafeterias and Kitchens*** — In eating areas the lighting should create a cheerful, comfortable area. Dining areas are frequently used for other activities and when so used the lighting should provide levels of illumination recommended for the task. Where the appearance of food is of prime consideration, as in the cafeteria, pleasant colours and appropriate sources should be used. Additional incandescent lighting may be used over the serving counter to give the food eye appeal, provide heat and to speed up the selection of food.

Good general lighting is needed in the kitchen especially at ranges, work tables and sinks to assure cleanliness, safety and good house-keeping.

**3.2.8 *Staff Rooms*** — Staff room is a place where teachers normally assemble for discussions, study, etc, or retire for relaxation during recess. These rooms should have good general illumination for performing visual tasks like reading and writing and the switching arrangement should be such that a group of lights could be switched off for a subdued level whenever the occupants are in mood of relaxing.

Supplementary local lighting should also be provided at the side of the user in the form of table lamp or wall lamp so that an individual could continue with his study without disturbing the other who may retire with comfort.

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\*Code of practice for library lighting.

#### 4. DAYLIGHT CONSIDERATION

**4.1** Special attention should be paid to the location of windows and openings in educational institutions which allow in a good amount of daylight, while designing a lighting system for any of the areas specified in this standard. Illumination should however be planned for night time use considering the various factor like evening classes, topography of the institution ( for example, for an institution located in the Eastern part of India, dark sets in much earlier during the day ), climatic conditions of the place where the institution is located ( for example, places where monsoons are prolonged or places in the Northern part of India where till noon the sun remains cut-off due to heavy fog during winter, etc ). Then in order to effect energy economy in the event of sufficient daylight filtering through the openings, due consideration should be given to switching arrangement so that an array of lights close to the windows could be switched off to extract maximum advantages of natural light.

#### 5. RECOMMENDED ILLUMINATION LEVELS AND GLARE INDEX

**5.1** The levels of illumination and glare index recommended for the different areas in educational institutions are given below:

<i>Areas</i>	<i>Illumination ( Lux )</i>	<i>Limitation of Glare Index</i>
a) Classrooms	300	16
b) Lecture rooms ( including Demonstration areas )	300	16
c) Reading rooms	150 to 300	19
d) Laboratories	300	16
e) Corridors	70	—
f) Libraries	300	16
g) Auditorium		
i) Hall	70	—
ii) Foyer	70	—
	150	—
iii) Stage area	300	16
h) Gymnasiums	150	—
j) Cafeterias	100	—
k) Staff Rooms	150	—